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(54) **METHOD AND APPARATUS FOR FEEDING SHEETS TO A PROCESSING MACHINE**

(75) Inventors: **Andreas Müller**, Heidelbeg (DE); **Burkhard Wolf**, Dossenheim (DE)

(73) Assignee: **Heidelberger Druckmaschinen AG**, Heidelberg (DE)

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B65H 5/22 (2006.01)

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(58) **Field of Classification Search** 271/7, 10.15, 271/248, 253, 194–197, 275–277, 3.23, 3.24, 271/270, 226
See application file for complete search history.

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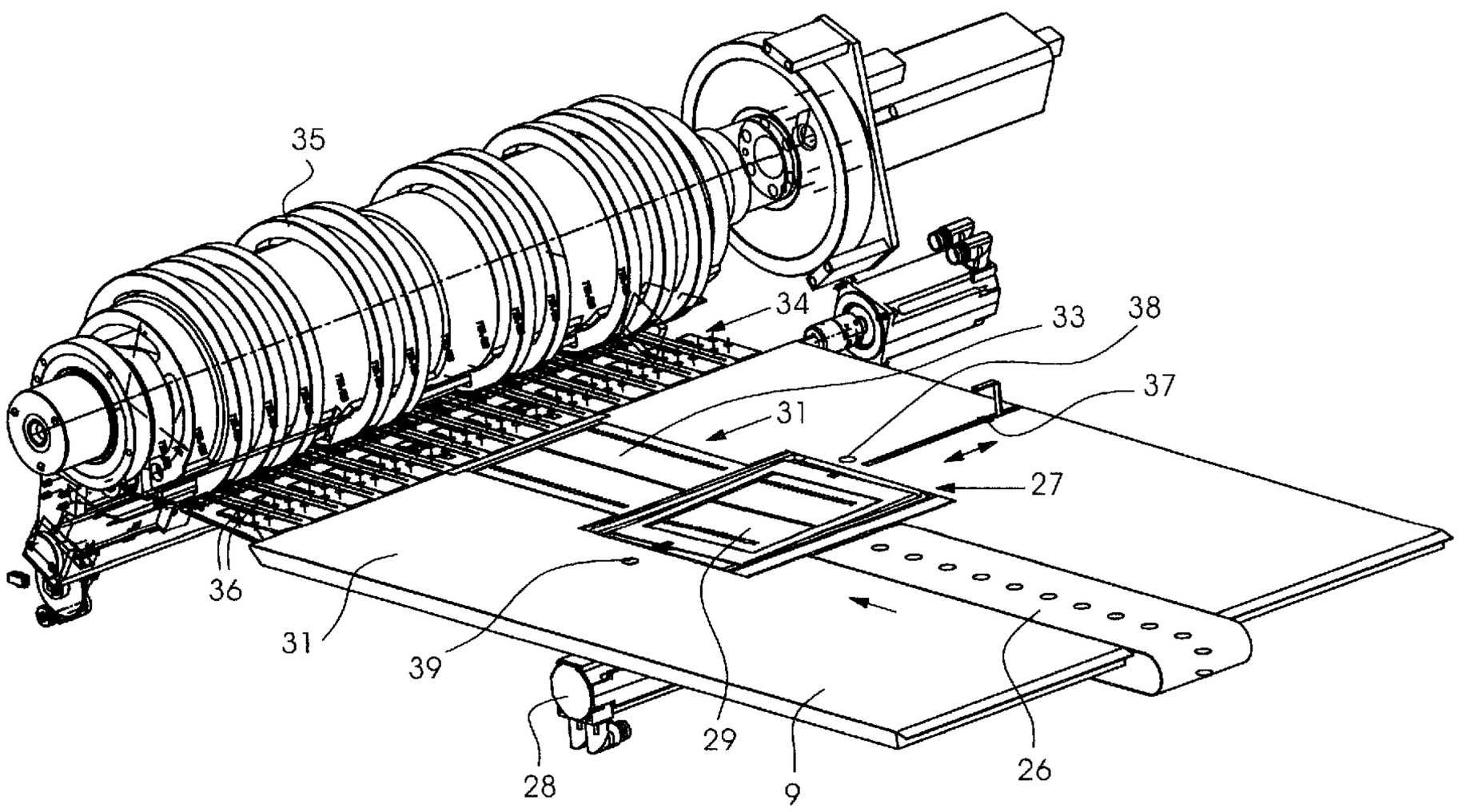
Primary Examiner — Michael McCullough
(74) *Attorney, Agent, or Firm* — Laurence A. Greenberg; Werner H. Stemer; Ralph E. Locher

(57) **ABSTRACT**

In a method and an apparatus for feeding sheets to a processing machine, in particular a printing press, provision is made for the sheet to be accelerated to processing speed by use of at least two acceleration stations arranged one after the other. One of the acceleration stations is arranged such that the acceleration station can be displaced in order to align the sheet.

7 Claims, 4 Drawing Sheets



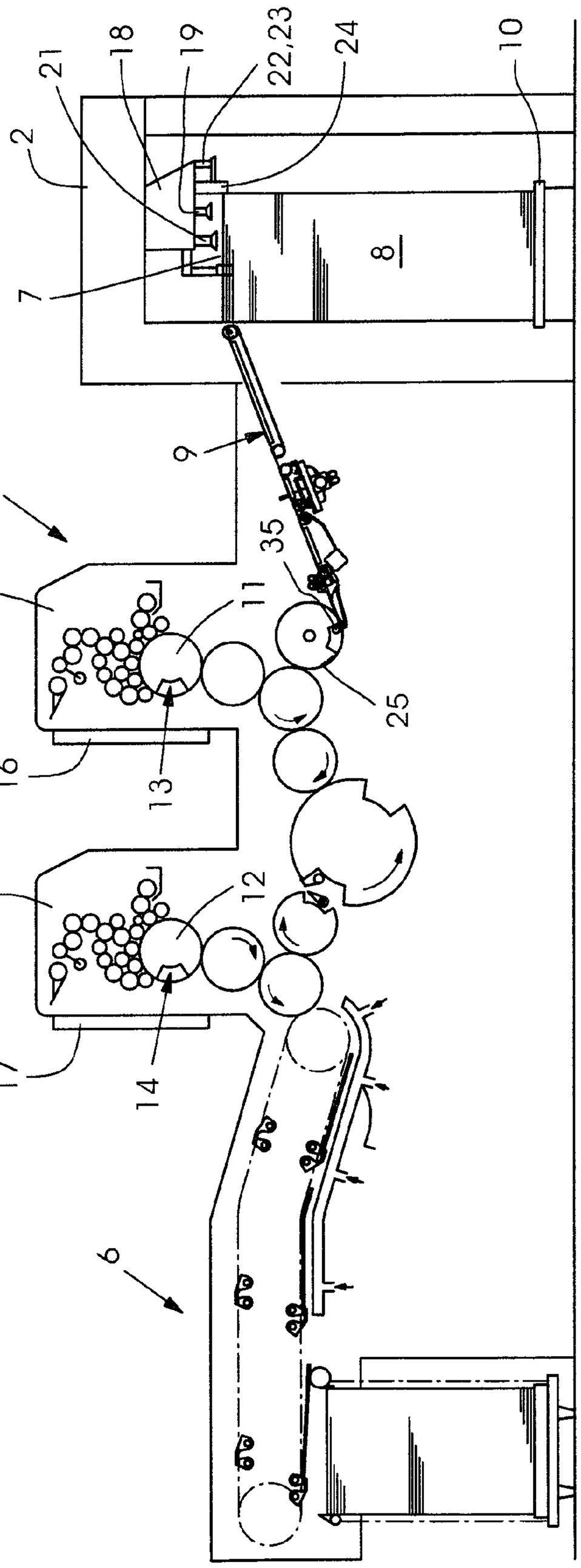


FIG. 1

FIG. 2

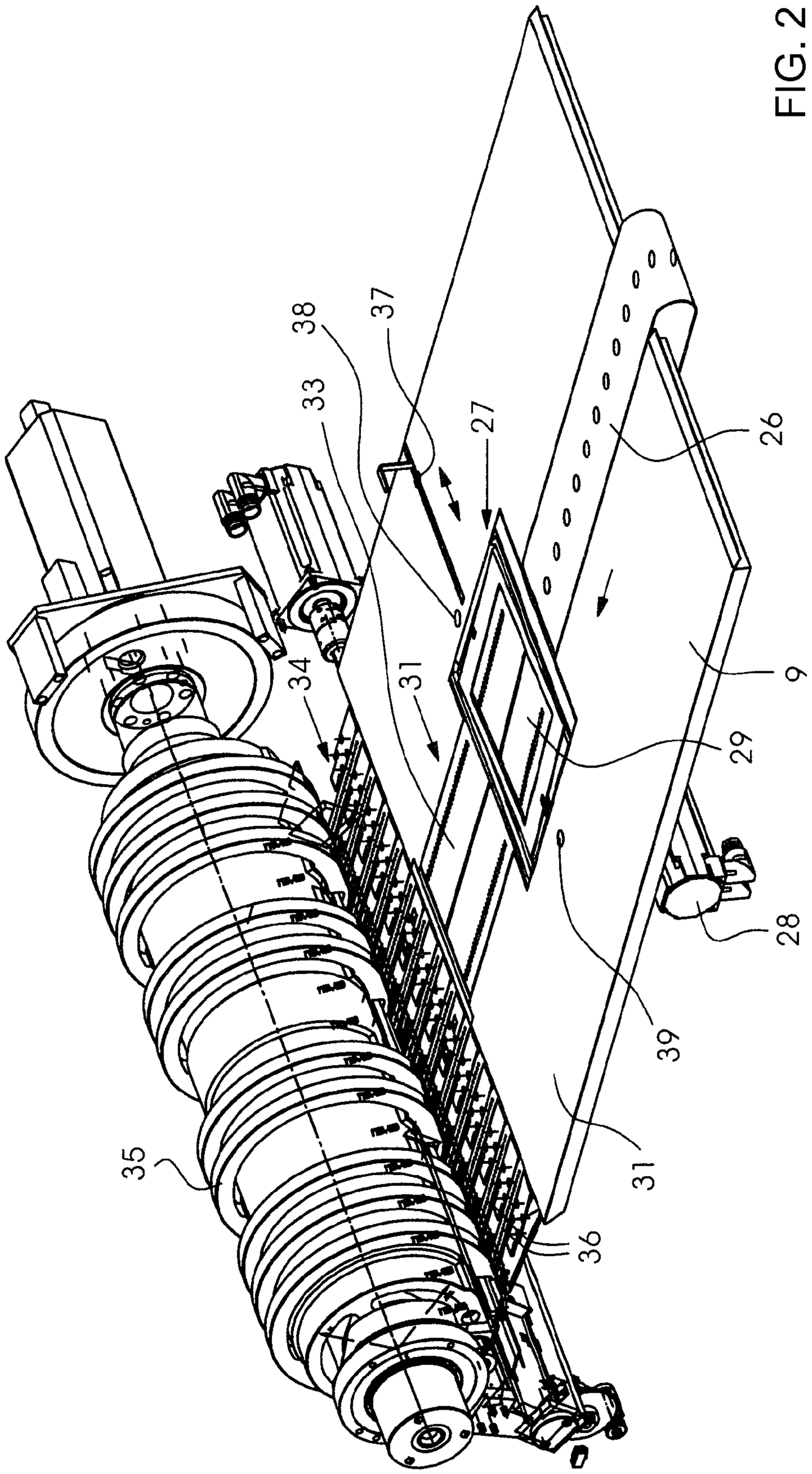
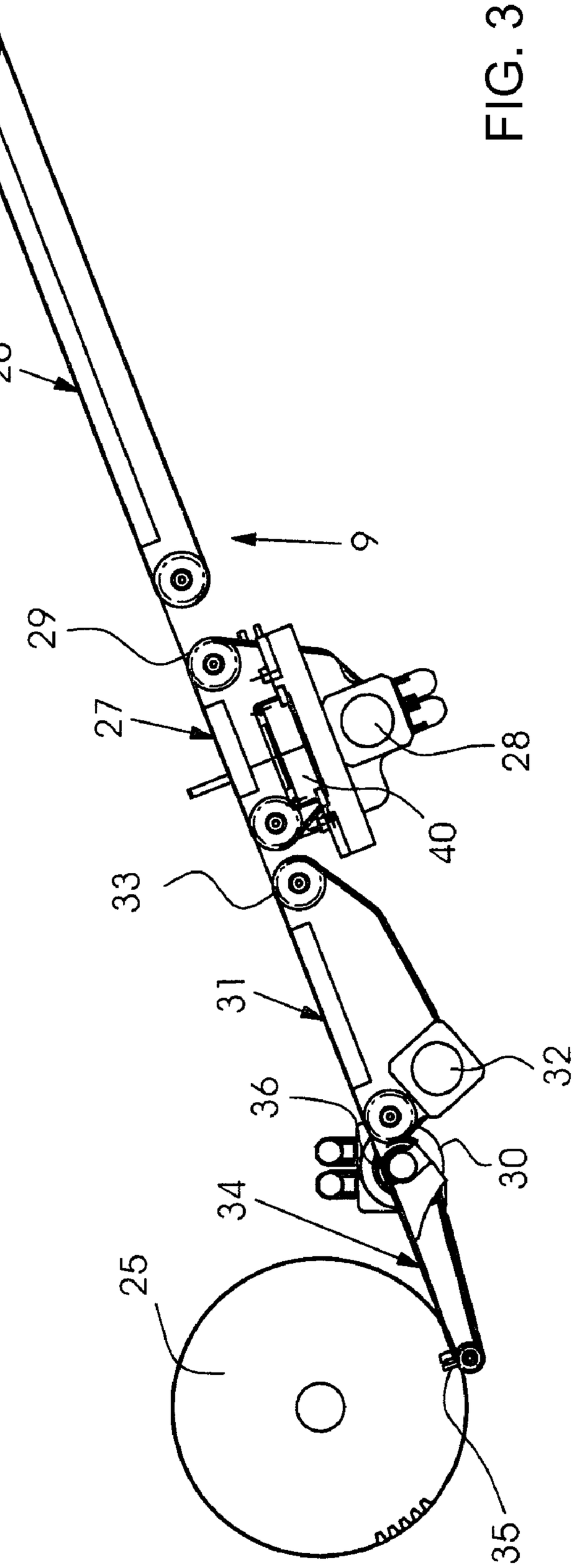


FIG. 3



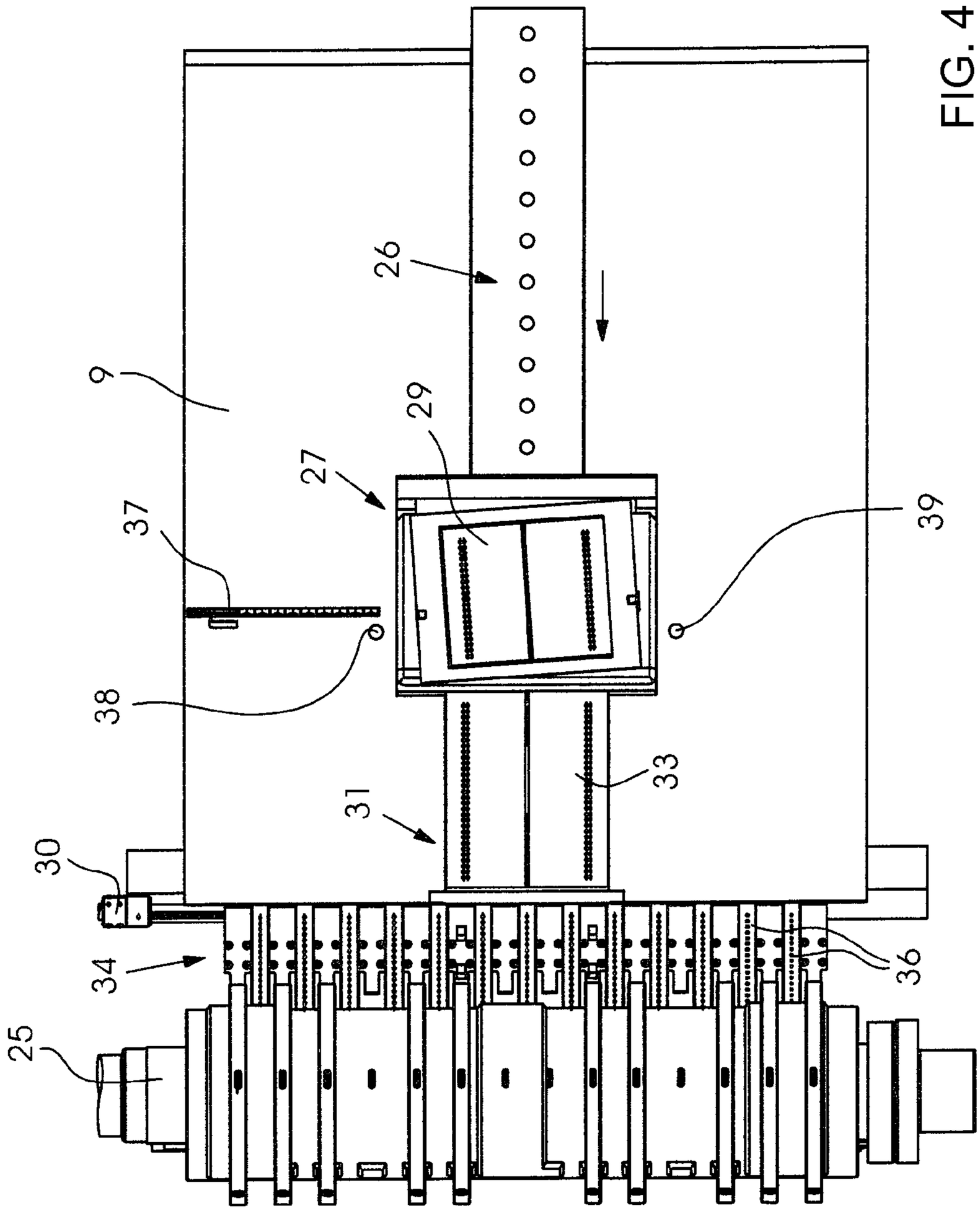


FIG. 4

METHOD AND APPARATUS FOR FEEDING SHEETS TO A PROCESSING MACHINE

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the priority, under 35 U.S.C. §119, of German application DE 10 2008 032 756.5, filed Jul. 11, 2008; the prior application is herewith incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

The invention relates to a method and an apparatus for feeding sheets to a sheet-processing machine, in particular a printing press.

In this case, the sheets are fed in overlapping formation to an acceleration station, by which they are accelerated to processing speed and aligned.

German patent DE 198 14 141 C2, corresponding to U.S. Pat. No. 6,213,282, already shows an apparatus for feeding flat goods, for example sheet metal panels, to a processing machine. In this case, the flat goods are fed one after another to various retardation stations and alignment stations.

The sheet metal panels are fed correspondingly slowly at a low processing speed.

SUMMARY OF THE INVENTION

It is accordingly an object of the invention to provide a method and an apparatus for feeding sheets to a processing machine that overcomes the above-mentioned disadvantages of the prior art devices and methods of this general type. The invention is based on the object of accelerating sheets transported in overlapping formation to a processing speed of the processing machine, for example a printing press, and of aligning them during the acceleration operation.

With the foregoing and other objects in view there is provided, in accordance with the invention, a method for feeding sheets to a sheet-processing machine. The method includes the steps of: feeding the sheets in an overlapping formation on a feed table to a first acceleration station and the sheets are accelerated by the first acceleration station; and feeding the sheets to at least one second acceleration station and the sheets are accelerated by the second acceleration station to a machine speed of the sheet-processing machine, before they are fed to sheet gripper devices of a feed cylinder of the sheet-processing machine.

A particular advantage of the invention is that the sheets can be fed at very high transport speeds (for example more than 20,000 sheets per hour) to a processing machine, in particular a printing press.

No stationary stops are needed to align the sheets.

Particularly advantageous is the arrangement of two or more acceleration stations arranged one after the other, one, preferably the first, simultaneously carrying out an alignment function.

A further advantage is the conditioning of the sheet before the transfer to gripper devices of a first feed cylinder of the sheet-processing machine, by use of a number of transport belts arranged at a distance beside one another. As a result of this measure, the sheet can be transferred to the grippers having been evened out and without creasing.

All the acceleration and alignment stations have transport belts to which vacuum can be applied. The application of vacuum can preferably be controlled at the cycle rate of the sheet-processing machine.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in a method and an apparatus for feeding sheets to a processing machine, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

FIG. **1** is a diagrammatic, side sectional view of a sheetfed rotary printing press;

FIG. **2** is a diagrammatic, perspective view of a feed device according to the invention;

FIG. **3** is a sectional view of the feed device; and

FIG. **4** is a plan view of the feed device.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings of the invention in detail, and in particular to FIG. **1** thereof, there is shown a machine for processing sheets **7**, for example a printing press **1**, that has a feeder **2**, at least one printing unit **3** and **4** and a deliverer **6**. The sheets **7** are taken from a sheet stack **8** and fed in overlapping formation over a feed table **9** to the printing units **3** and **4**. The latter each contain, in a known manner, a plate cylinder **11**, **12**. The plate cylinders **11** and **12** each have an apparatus **13**, **14** for fixing flexible printing plates.

Furthermore, each plate cylinder **11**, **12** is assigned an apparatus **16**, **17** for the semiautomatic or fully automatic printing plate change.

The sheet stack **8** rests on a stack board **10** that can be raised under control. The removal of the sheets **7** is carried out from the top of the sheet stack **8** by what is known as a suction head **18** which, among other things, has a number of lifting and dragging suckers **19**, **21** for separating and overlapping the sheets **7**. Moreover, blowing devices **22** are provided in order to loosen the upper sheet layers, as are sensing elements **23** for stack tracking. To align the sheet stack **8**, in particular the upper sheets **7** of the sheet stack **8**, a number of side and rear stops **24** are provided.

In order to transport the overlapping stream, the feed table **9** has at least a first transport belt **26** (FIG. **2**), which is formed as what is known as a "suction belt" and can preferably be driven continuously at a cycle rate of the sheet-processing machine by a drive motor or by the feeder of the printing press.

Arranged downstream of the transport belt **26** in the sheet transport direction (arrow in FIGS. **2**, **3**, **4**) is a first acceleration station **27**. The first acceleration station **27** has an individual drive **28** that can be activated independently of the drive of the transport belt **26**. The acceleration station **27** has at least one transport belt **29**, which is formed as a "suction belt" and can have vacuum applied to it as a function of the position of the sheet to be accelerated.

Arranged downstream of the first acceleration station **27** is at least one second acceleration station **31**. The second acceleration station **31** has a drive **32** and substantially contains at least one transport belt **33** to which vacuum can be applied.

Arranged downstream of the second acceleration station **31** is a transport station **34**, which has a number of suction belts **36** arranged at a distance beside one another, which can be driven jointly by a drive **30** at the speed of the sheet-processing machine and support and transport the sheet **7** to be fed over its entire width, until the sheet is gripped by gripper devices **35** of a feed cylinder **25**. The suction belts **36** can have vacuum applied to them jointly, the application of vacuum being controllable at the cycle rate of the sheet-processing machine.

In order to align the sheet **7** to be fed, the transport belt **29** of the first acceleration station **27** is constructed such that it can be adjusted obliquely and displaced sideways.

In order to grip a side edge of the sheet **7**, a sensor **37** that can be adjusted to the transverse format to be processed is provided and, in the sheet transport direction, is arranged in the region of the first alignment station **27**.

Two further sensors **38**, **39** register the leading edge of the sheet **7** approximately at the same height and at the same time as the sensor **37** and, following a desired-actual value comparison, control a drive **40** for the oblique positioning of the transport belt **29** and the first acceleration station **27**. A correction to the lateral position of the transport belt **29** and the first acceleration station **27** is carried out by using a desired-actual value comparison of the values of the position of the sheet, which are determined by the sensor **37**.

After the sheet has been accelerated and aligned with respect to the speed in the overlapping stream, it is gripped by the second acceleration station **31** and accelerated to machine speed.

Arranged downstream of the second acceleration station **31** or the further acceleration stations is the transport station **34**, which is driven at machine speed. The transport station **34** contains a number of transport belts **36** arranged at a distance beside one another, which are arranged in the feed table **9**, distributed over the maximum format width to be processed. The transport belts **36** grip the sheet over its entire width and condition and even out the latter, so that the sheet **7** can be transferred without any stresses to the gripper device **35** of the feed cylinder **25**.

In the preferred exemplary embodiment according to FIG. **3**, an additional sensor **41** is provided to detect the lateral position of the sheet. Following a desired-actual value comparison, the sheet can be aligned sideways once more on the feed cylinder **25**.

The invention claimed is:

1. A method for feeding sheets to a sheet-processing machine, which comprises the steps of:

feeding the sheets in an overlapping formation on a feed table to a first acceleration station and the sheets being accelerated by the first acceleration station;

providing a skewed position correction to the sheets by the first acceleration station as the sheets are accelerated;

feeding the sheets to at least one second acceleration station and the sheets being accelerated by the at least one second acceleration station to a machine speed of the sheet-processing machine, before the sheets are fed to sheet gripper devices of a feed cylinder of the sheet-processing machine; and

feeding the sheets via a transport device that is driven continuously at a cycle rate of the sheet-processing machine to the gripper devices of the feed cylinder of the sheet-processing machine, after the sheets have been accelerated to the machine speed.

2. The method according to claim **1**, which further comprises aligning the sheets sideways in a transport plane by the first acceleration station, as the sheets are accelerated.

3. An apparatus for feeding sheets to a sheet-processing machine, the apparatus comprising:

a feed table on which the sheets are transported in overlapping formation;

a first acceleration station for a sheet, said first acceleration station disposed in said feed table, said first acceleration station being adjustably mounted to said feed table for sheet alignment;

at least one second acceleration station for the sheet disposed downstream of said first acceleration station; and

a transport device for being driven at a cycle rate of the sheet-processing machine, said transport device being disposed downstream of said first and at least one second acceleration stations.

4. The apparatus according to claim **3**, wherein said transport device and said first and at least one second acceleration stations have transport belts.

5. The apparatus according to claim **4**, wherein said transport belts are assigned suction apparatuses for applying vacuum individually to said transport belts.

6. The apparatus according to claim **4**, wherein said first acceleration station is adjustably mounted to said feed table for adjustment in an oblique direction relative to a transport plane.

7. The apparatus according to claim **4**, wherein said first acceleration station is adjustably mounted to said feed table for adjustment in a sideways direction on a transport plane.

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